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RESEARCH ARTICLE

The effect of oral hygiene practices on periodontal health in adult population of two states in India

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Abstract

Good oral hygiene is considered to be an essential factor for periodontal health, and the most suitable oral hygiene habit is regular and accurate tooth brushing technique and use of supplemental oral hygiene aids. Comparatively few studies have evaluated the association of oral hygiene practices on periodontal health conditions. The aims of the present study were to investigate the routine oral hygiene practices in adult population within two states of India and to analyze and assess the effect of regular oral hygiene practices on periodontal health of adults. A cross-sectional survey was conducted on the adult population within the states of Karnataka (KA) and Madhya Pradesh (M.P). The sample consisted of 130 adults. The research tool consisted of a semi structured questionnaire with 13 questions. A clinical examination was carried out in natural light using mouth mirror and explorer. The Periodontal Index by Russell A.L (1956) used to assess the clinical status of the gingival and periodontal tissue. Individual scores were assigned to each subject and a subsequent clinical assessment was made. Results showed that highest percentage of sample adult population in Karnataka suffered from advanced periodontal disease (47.6%) whereas in M.P the score was higher towards simple gingivitis (33.8%) and association between two population was statistically significant. Highest percentage of adults (88.2% males, 64.5% females in Karnataka and 34.5% males and 88.9% females in M.P.) used toothpaste and toothbrush as their principle mode for tooth cleaning and their corresponding mean PI scores were relatively lower in relation to other modes of tooth cleaning stated. Hence it can be concluded that practicing good oral hygiene care and leading a healthy lifestyle form the primary pillars for maintenance of oral health.

Introduction

Oral hygiene practices play a vital role in preservation of sound dental and periodontal health. Good oral hygiene is considered to be an essential factor for periodontal health and the most suitable oral hygiene habit is regular and accurate toothbrushing technique and use of supplemental oral hygiene aids. (Barzan et al,2006&Harris, 2004&Baelum et al 1993).Numerous studies have confirmed a remarkable decrease in gingival inflammation and pocket depths with improvement in oral hygiene.(Elizabeth et al 2012).Therefore it is imperative to improvise on the daily oral hygiene measures.

Negligence in maintaining oral health can cause bacterial build up and plaque formation, paving way to pathogenic bacterial species associated with severe forms of periodontal diseases.(Elizabeth et al 2012&Axelsson et al 2004 &Amin 2012&Wolff et al 1994).Population studies provide strong evidence of inter-relationship between dental plaque and development of gingivitis,subsequently followed by periodontal breakdown.(Barzan et al, 2006&Amin 2012&Loe et al 1965). Periodontal diseases are one of the most prevalent chronic diseases affecting individuals of all age groupsuniversally.(Poul Erik Peterson, 2005&Papanou 1999 &Ismail et al 1993).Even though the disease occupies significant fraction of the existing oral diseases, less attention has been given to assess the risk factors and

prevalence in populations at large.(Poul Erik Peterson, 2005&Benoît et al 2004 &Pilot et al 1987).Therefore analysing the risk factors and indicators can help in maintaining oral health and prevent the development of any form of periodontal diseases. Commonly associated factors include poor oral and dental health,poor diet,habits and underlying systemic conditions.(Elizabeth et al 2012Amin 2012&Poul Erik Peterson, 2005).Preventive measures are directed at eliminating the factors associated with plaque formation that weakens tissue resistance.

Studies and surveys depict that there is a marked laxity of dental awareness amongst Indian population.(Pilot et al 1987).Less than one-third follow proper oral hygiene measures on a regular basis resulting in various periodontal conditions.(Pilot et al 1987). Comparatively few studies have evaluated the association of oral hygiene practices on periodontal health conditions. Keeping the above facts in consideration, the aims of this study wereto:

1.Investigate the routine oral hygiene practices in adult population within two states of India.

2.Analyze and assess the effect of regular oral hygiene practices on periodontal health of adults.

Material and Methods

A cross-sectional survey was conducted on the adult population within the states of Karnataka (KA) and Madhya Pradesh (M.P). The sample consisted of 130 adults, attending various primary health care centres, private hospitals/clinics in Mangalore(KA) and Sehore (M.P).Inclusion criteria for the survey included adults both males and females in the age group of 25-40 years who were willing to participate in the survey.

The sample was divided state and gender wise into two groups:

Karnataka (KA) :65 adults; 34 males and 31 females

Madhya Pradesh (M.P):65 adults; 29 males and 36 females.

The research tool consisted of a semi structured questionnaire with 13 questions.Each question was formulated after a comprehensive review of relevant literature and the final questionnaire contained items that were simple and straight forward to the aim of the survey. The questionnaire was filled with the help of a principal investigator. The first part of the questionnaire contained questions pertaining to the demographic factors of the participants while the later part consisted of questions related to the knowledge and practice of oral hygiene on a routine basis.

A clinical examination was carried out in natural light using mouth mirror and blunt probe. ThePeriodontal Index by Russell A.L (1956) used to assess the clinical status of the gingival and periodontal tissue.Individual scores were assigned to each subject and a subsequent clinical assessment was made.

Data was analyzed using Statistical Package for Social Sciences (SPSS), version 11.5 (SPSS Inc, Chicago IL).Descriptive statistics were calculated. Chi-square test was applied to determine the association between the oral hygiene practices and associated periodontal condition.

Results

The sample consisted of 130 adults; 34 males and 31 females from Karnataka and 29 males, 36 females from M.P.The sample distribution according to mean age and gender is shown in Table 1. About3% of the adults in M.P and 1.5% populationin Karnataka reported a clinically normal periodontium.The highest percentage of sample adult population in Karnataka suffered from advanced periodontal disease (47.6%) whereas in M.P the score was higher towards simple gingivitis(33.8%)[Table 2] and association between two population was statistically significant.

Highest percentage of adults (88.2% males, 64.5% females in Karnataka and 34.5% males and 88.9% females in M.P.) used toothpaste and toothbrush as their principle mode for tooth cleaning (Table 3) and their corresponding mean PI scores were relatively lower in relation to other modes of tooth cleaning stated .According to the percentage distribution in (Table 4), the frequency of adults using soft toothbrush in the state of M.P was 20.7% males, 72.7% females andin Karnataka was 50% males, 38.7% females .The mean PI score associated with regular use of soft toothbrush was lower in relation to use of a hard toothbrush.

At the state level, the awareness to emphasize upon various factors while purchasing a toothbrush is depicted inTable 5. Table 6 presents the sample distribution according to the frequency to change the toothbrush and the associated mean PI score. Both states recorded a significantly higher score where the question was unanswered stating a lack of knowledge in the subject matter.Association is proved to be statistically significant.

According to frequency of tooth brushing and associated mean PI scores,it was observed that twice a day brushing habit recorded a relatively lower mean score in both states than brushing once a day. The percentage population with twice a day brushing was 61.4 %(32.4% males, 29%females) in KA and 45.8 %(6.9%males and 38.9% females) in M.P respectively. On the other hand, the variation in mean scores extracted from the sample on the basis of duration of tooth brushing (Table 7) in both states proved to be statistically insignificant.

According to the data distribution in Table 8,55.9% males,35.5% females in KA and 13.8% males, 19.4% females in M.P were aware of various causes to change a toothbrush.The relative PI scores recorded in these subjects were relatively lower from the rest of the sample population.

Table 9 represents the percentage distribution of adults according to existing habits. The mean PI score in adults with no habits was significantly lower.The sample distribution according to prevailing systemic conditions (Table 10) recorded a high mean PI scores in subjects suffering from chronic diseases like diabetes and hypertension than in clinically healthy individuals.Thesedistribution was statistically significant.

Table 1: Distribution of sample population in each state according to age and gender

GENDER	Karnataka (MEAN AGE±S.D)	M.P(MEAN AGE±S.D)
Male	34 (36.15±4.29)	29 (34.75±4.36)
Female	31 (35.06±3.85)	36 (36.08±2.51)

Table 2: Distribution of the adult population according to the severity of periodontal condition

Grade	Karnataka		M.P		Total	
	Male(34)	Female(31)	Male (29)	Female (36)	Karnataka (65)	M.P(65)
Clinically normal supportive tissue	-	1(3.2%)	2(6.8%)	6(16.6%)	1 (1.5%)	8 (12.3%)
Simple gingivitis	5(14.7%)	4(12.9%)	8(27.5%)	14(38.8%)	9 (13.8%)	22 (33.8%)
Beginning destructive periodontal disease	10(29.4%)	9(29%)	9(31%)	8(22.2%)	19 (29.2%)	17 (26.1%)
Established lesion	16(47%)	15(48.3%)	7(24.1%)	8(22.2%)	31 (47.6%)	15 (23%)
Terminal disease	3(8.8%)	2(6.45%)	3(10.3%)	-	5 (7.6%)	3 (4.6%)

$p<0.05$- statistically significant

Table 3: The number and percentage of adult population according to the choice of methodof cleaning teeth and respective PI score

State	Gender	No	Distribution of adults according to methods of cleaning teeth and the corresponding mean PI score										
			1,2#	2#	3#	4#	5#	6#	1,2,4 ,6#	1,2,3#	1,3#	2,4#	3,4#
KA	Male	34	30 (88.2%) (1.98±1)	1(2.9%) (3.80)	1(2.9%) (4.40)	-	-	-	-	-	-	-	2(5.9%) (5.50)
	Female	31	20(64.5 %)(2.35 ±1.49)	-	-	-	-	2(6.5 %) (2.85± 1.62)	1(3. 2%) (3.1)	-	2(6.5%) (1.45±0 .21)	-	6(19.4%) (2.73±2. 01)
M.P	Male	29	10(34.5 %)(0.90 ±0.48)	-	1(3.4%) (3.10)	1(3 .4 %) (5)	2(6. 9%) (0.3 1±0. 16)	-	-	1(3.4%) (0.4)	3(10.3 %)(2.9 0±1.64)	1(3.4 %)(6. 70)	10(34.5 %) (2.39±1. 71)
	Female	36	32(88.9 %)(1.12 ±1.17)	-	-	-	-	-	-	-	1(2.8%) (1.2±1.	-	3(8.3%) (2.53±1. 50)

											2)		

p<0.05- statistically significant
#: Various modes of tooth cleaning

1	Toothbrush
2	Toothpaste
3	Toothpowder
4	Finger
5	Neem stick
6	Coal powder
7	Tobacco
8	Any other

Table 4: The number and percentage of adults according to the type of toothbrush usedand respective PI score

State	Gender	No	Frequency and percentage of type of toothbrush used and the mean PI score				
			soft	medium	hard	Don't know	Not willing to answer
KA	male	34	17(50%) (1.81±1.14)	3(8.8%) (2.26±0.51)	5(14.7%) (2.24±1.21)	7(20.6%) (2.71±1.01)	2(5.9%) (5.50±0)
	female	31	12(38.7%) (2.06±1.18)	2(6.5%) (0.95±0.63)	1(3.2%) (1.20)	9(29%) (3.23±1.51)	7(22.6%) (2.58±1.88)
M.P.	male	29	6(20.7%) (0.95±0.56)	3(10.3%) (1.93±2.48)	3(10.3%) (1.16±0.75)	2(6.9%) (1.56±0.62)	15(51.7%) (2.62±2.07)
	female	36	26(72.2%) (1.08±1.01)	1(2.8%) (2.15)	-	5(13.9%) (1.29±1.94)	4(11.1%) (1.97±1.66)

p<0.05- statistically significant

Table 5: The number and percentage of adults according to the reasons for purchase of a toothbrushand respective PI score

State	Gender	No.	Reason for purchasing a toothbrush with their respective mean PI score				
			Type	Brand	Cost	No reason	Not willing to ans.
KA	Male	34	1(2.9%)(1.9)	6(17.6%) (1.84±1.2)	-	21(61.8%) (2.4±1.01)	6(17.6%) (2.4±2.3)
	Female	31	-	2(6.5%) (1.95±0.7)	2(6.5%)(2.6±1.4)	16(51.6%) (2.3±1.6)	11(35.5%) (2.6±1.5)
M.P.	Male	29	1(3.4%)(0.3)	2(6.9%) (1.8±1.76)	3(10.3%)(1.5±0.3)	8(27.6%)(1.52±1.4)	15(51.7%) (2.4±2.14)
	Female	36	1(2.8%)(0.9)	-	10(27.8%) (1.4±1.38)	10(27.8%) (1.29±1.10)	15(41.7%) (1.07±1.29)

p<0.05- statistically significant

Table 6: The number and percentage of adults according to frequency to change toothbrushand mean PI score

State	Gender	No	Frequency to change toothbrush and the corresponding mean PI score			
			Every month	3 months	6 months	Not willing to ans.
KA	Male	34	2(5.9%) (1.85±0.3)	17(50%) (1.9±1.04)	11(32.4%) (2.34±1.1)	4(11.8%) (4.15±2.03)
	Female	31	5(16.1%) (3.3±2.0)	10(32.3%) (2.04±1.3)	8(25.8%) (2.01±0.9)	8(25.8%) (2.76±1.81)

M.P	Male	29	5(17.2%) (2.16±1.5)	3(10.3%) (0.8±0.62)	8(27.6%) (1.54±1.4)	13(44.8%) (2.46±2.17)
	Female	36	7(19.4%) (1.6±1.3)	19(52.8%) (0.8±1.15)	7(19.4%) (1.32±0.93)	3(8.3%) (2.53±1.5)

p<0.05- statistically significant

Table 7: The number and percentage of adults according to the duration of tooth brushingand mean PI score

State	Gender	No	Duration of tooth brushing and the mean PI score			
			1-3 mins	3-5 mins	>5 mins	No response
KA	Male	34	8(23.5%) (2.3±1.3)	18(52.9%) (2.1±1.4)	7(20.6%) (2.2±0.8)	1(2.9%) (4.4)
	Female	31	11(35.5%) (2.4±1.3)	11(35.5%) (2.4±1.9)	7(22.6%) (2.2±1.3)	2(6.5%) (2.9±1.5)
M.P	Male	29	22(75.9%) (2.07±1.9)	4(13.8%) (0.9±0.4)	3(10.3%) (2.6±1.9)	-
	Female	36	13(36.1%) (1.3±0.9)	21(58.3%) (1.08±1.2)	2(5.6%) (2.4±3.18)	-

p<0.05- statistically significant

Table 8: The number and percentage of adults according to the choice of reasons for changing the toothbrush and their mean PI score

State	Gender	No	Reasons for changing the toothbrush and the mean PI score			
			Fraying of bristle	Fading of colour	No specific reason	Not willing to ans.
KA	Male	34	17(50%) (1.9±1.0)	2(5.9%) (3.2±1.4)	8(23.5%) (2.3±0.7)	7(20.6%) (2.8±2.2)
	Female	31	11(35.5%) (2.6±0.9)	-	7(22.6%) (1.8±2.2)	13(41.9%) (2.5±1.4)
M.P	Male	29	4(13.8%) (0.9±0.4)	-	11(37.9%) (1.5±1.3)	14(48.3%) (2.5±2.14)
	Female	36	7(19.4%) (1.6±1.6)	-	17(47.2%) (1.1±1.02)	12(33.3%) (1.8±1.3)

p>0.05- notstatistically significant

Table 9: The number and percentage of adults according to prevalent habits

State	Gender	Existing oral habits in the adult population and associated mean PI score								
		Smoking	Tobacco	Pan chewing	Betel quid	Smoking+ betel quid	Tobacco +pan	Smoking + tobacco	All	None
KA	Male	2(5.9%) (2.2±o.7)	7(20.6%) (2.2±1.3)	-	-	-	-	3(8.%) (4.1±2)	3(8.8%) (3.4±1.3)	18(52.9%) (1.8±0.9)
	Female	-	3(9.7%) (3.4±1.6)	-	1(3.2%) (4.6)	-	-		-	26(83.9%) (2.1±1.4)
M.P	Male	2(6.9%) (2.5±3.4)	9(31%) (2.5±1.8)	1(3.4%) (4.8)	2(6.9%) (4.6±0.8)	1(3.4%) (3.3)	1(3.4%) (0.2)	-	3(10.3%) (1.8±1.12)	10(34.5%) (0.6±0.4)
	Female	-	2(5.6%) (2.2±1.2)	-	1(2.8%) (3.7)	-	-	-	-	33(91.7%) (1.1±1.1)

p<0.05- statistically significant

Table 10: The number and percentage of adults suffering from systemic conditions

State	Gender	No	Distribution according to existing systemic conditions and the mean PI score			
			Diabetes	Hypertension	None	Not willing to ans.
KA	Male	34	-	4(11.8%) (4.2±1.8)	22(64.7%) (1.9±1.0)	7(20.6%)
	Female	31	-	4(12.9%) (3.5±2.2)	18(58.1%) (2.2±1.4)	7(22.6%)
M.P.	Male	29	1(3.4%) (1.9)	1(3.4%) (2.0)	24(82.8%) (1.7±1.8)	3(10.3%)
	Female	36	-	2(5.6%) (1.3±0.2)	32(88.9%) (1.1±1.2)	2(5.6%)

p<0.05- statistically significant

Discussion

At the baseline examination about 47.6% adults from KA and 23% adults from M.P exhibited the presence of advanced periodontal disease condition.

An important observation made in the current study was that efficient routine oral hygiene practices (correct method, frequency and duration of tooth brushing, awareness about the dental products, lack of habits) were associated with a relatively lower mean PI score. A longitudinal a year old study with a similar outline conducted by Waerhaug group(Axelsson et al 2004) on employees of a factory in Oslo(>800 subjects,20-59 years age) recorded 60% improvement in periodontal health and a 50% reduction in tooth loss after improvement in oral hygiene conditions (careful approach towards correct brushing techniques, interdental aids).Oral health surveys conducted in Burkina Faso, Africarevealed similar findings.(Benoît et al 2004). They reflected prevalence of advanced periodontal diseases in adults with poor oral hygiene. In a landmark publication Loe et al demonstrated a substantial regression in gingival inflammation post proper oral hygiene intervention.(Axelsson et al 2004).Findings from a similar clinical trial suggest that regular tooth brushing induced marked reduction in the inflammatory conditions of gingiva.(Ismail et al 1993).As regards to the collected data, it could be suggested that our survey confirmed the previous observation of a uniform association of poor oral health with the prevalence of periodontal conditions.

Additionally,the present data disclosed a negative impact of existing habits and systemic conditions on the periodontal health. The mean PI score recorded was lower among individuals who abstained from all habits and practiced a healthy lifestyle. The results come in agreement with a report submitted by WHO on the prevention of periodontal diseases[9].Findings from similar studies concluded a strong association of smoking and tobacco habit with periodontal attachment loss.(Poul Erik Peterson, 2005).According to the established studies heat from smoking and nicotine in tobacco impairs healing and enhances attachment loss causing periodontal breakdown. (Axelsson et al 2004) A regular use of tobacco and other harmful substances in any form can affect the immune system in the long run and lower down the host resistance paving way to multiple oral and systemic conditions.

(Poul Erik Peterson, 2005). Association of systemic conditions with periodontal breakdown is a well documented fact. Studies have concluded greater prevalence and rapid progression of periodontal conditions in individuals with diabetes mellitus(Poul Erik Peterson, 2005).

In short, the survey indicatedthat the prevalence of good oral hygiene practices in the adult population was associated with relatively healthy periodontium. The need of oral health care and oral hygiene awareness was evidenced in the population. However, no assessment was recorded for the plaque and calculus in the sample population. Since plaque plays a key role in progression of periodontal disease.(Axelsson et al 2004 &Amin 2012&Ismail et al 1993).The scope for further studies in this regard is still open. Research must continue to evaluate the effectiveness of various oral hygiene measures and techniques so that importance of these factors can be realized by population. The main drawback of the study was small sample size. So it is difficult to interpret the statistical significance to clinical relevance.

Conclusion

- The highest percentage of sample adult population in Karnataka suffered from advanced periodontal disease whereas in M.P the score was higher towards simple gingivitis.
- Those who used toothpaste and toothbrush as their principle mode for tooth cleaning had corresponding mean PI scores were relatively lower in relation to other modes of tooth cleaning stated.
- The mean PI score associated with regular use of soft toothbrush was lower in relation to use of a hard toothbrush. It was observed that twice a day brushing habit recorded a relatively lower mean score in both states than brushing once a day.
- Majority of the study subjects in both states were unaware about frequency to change the toothbrush and the question was unanswered stating a lack of knowledge.
- Persons with habits like smoking and smokeless tobacco also with systemic condition like diabetes and hypertension had relatively higher PI score compared to without habits and systemic conditions.

Hence it can be concluded that practicing good oral hygiene care and leading a healthy lifestyle form the primary pillars for maintenance of oral health. In light of the current pattern of periodontal diseases, specific measures have to be taken for mass awareness in order to inculcate efficient habits of oral hygiene in the population at large.The measures should be directed primarily at the prevention and maintenance or oral health.Oral health education on a mass level in primary health care centres, clinics and hospitals have to be given importance.Assessment of initial signs and symptoms of developing periodontal conditions can help in arresting the progression of the disease process.

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